

## **Fabrication of metal-clad plasmon resonators**

Hideki T. Miyazaki<sup>1</sup> and Yoichi Kurokawa<sup>2</sup>

<sup>1</sup>Materials Engineering Laboratory, National Institute for Materials Science,  
1-2-1 Sengen, Tsukuba, Ibaraki 305-0047, Japan.

Email: MIYAZAKI.Hideki@nims.go.jp

<sup>2</sup>International Center for Young Scientists, National Institute for Materials Science,  
1-1 Namiki, Tsukuba, Ibaraki 305-0044, Japan.

An infinite slit in a Drude material film shows resonance by multiple reflection of the propagation mode of a metal-clad waveguide[1]. As the slit width is reduced, the wavelength of the propagating wave becomes shorter; we can obtain a smaller optical resonator. We used a metal/dielectric/metal multilayer film to realize a very narrow slit. When a light polarized vertically to the substrate is incident from the side, the dielectric core layer works as a slit sandwiched between Drude materials. We manufactured resonators with various cavity lengths by milling Au/SiO<sub>2</sub>/Au films with a focused ion beam. In the reflection spectra, dips predicted by the calculation[1] were observed. These are due to the plasmon resonance. As the cavity length becomes shorter, the dips moved from red to blue. Resonance of a plasmon with a wavelength as short as 100nm was observed in the visible frequency range.

[1] Y. Kurokawa and H. T. Miyazaki, PECS-VI, submitted (2005).